Depreciation

General Mathematics

HSC

Name: _____

HSC CAPACITY MATRIX – GENERAL MATHEMATICS

TOPIC: Financial Mathematics 6 – Depreciation 2 weeks

CONTENT	CAPACITY BREAKDOWN!	DONE IT!!!!	GOT IT!!!!!	ON MY WAY!	WORKING ON IT!	HELP!!!!
1. Modelling depreciation by appropriate graphs, tables and functions	Skillsheet 10.1 Skillsheet 10.2 Ex 10A					
2. Using formulae for depreciation: a. Straight line method Salvage = $V_0 - D$ b. Declining balance method $S = V_0(1-r)^n$	Skillsheet 10.3 Ex 10B Ex 10C					
3. Preparing tables of values and developing graphs of r against n for different rates of r (exponential decay) 4. Comparing results obtained through each method 5. Using the above formulae to create and compare depreciation tables	S/S task: Depreciation tables p 328 Ex 10D Modelling task: Used car prices					
6. Calculating tax deductions based on depreciation of assets.	Throughout exercises					

Your say!

What was the most important thing you learned?_____

What was something new you learnt? _____

What part(s) of this topic will you need to work on? _____

Modelling Depreciation

- An **asset** is an item that has value to its owner. Many assets lose their value over time. This is referred to as **Depreciation**.

investigation

Choose a make of car and find out the price for a new vehicle of this make and model. Research the price of the same model as a second hand car and complete the table (you may add years if you are able to obtain the price)

Age of car (years)	Price
New	
1	
2	
3	
4	
5	

From your information construct a graph that compares the price of the car as it ages and continue the line for 15 years.

Depreciation Types

Depreciation

Straight line Depreciation

The item loses a constant amount of value each year.

Graphed using a linear function

$V = V_o - Dn$

V = salvage value

V_o = original price

D = depreciation amount

n = number of periods

Declining value Depreciation

The item loses a percentage of its value each year.

Graphed using an exponential function

$V = V_o(1 - r)^n$

V = salvage value

V_o = original price

r = rate as %

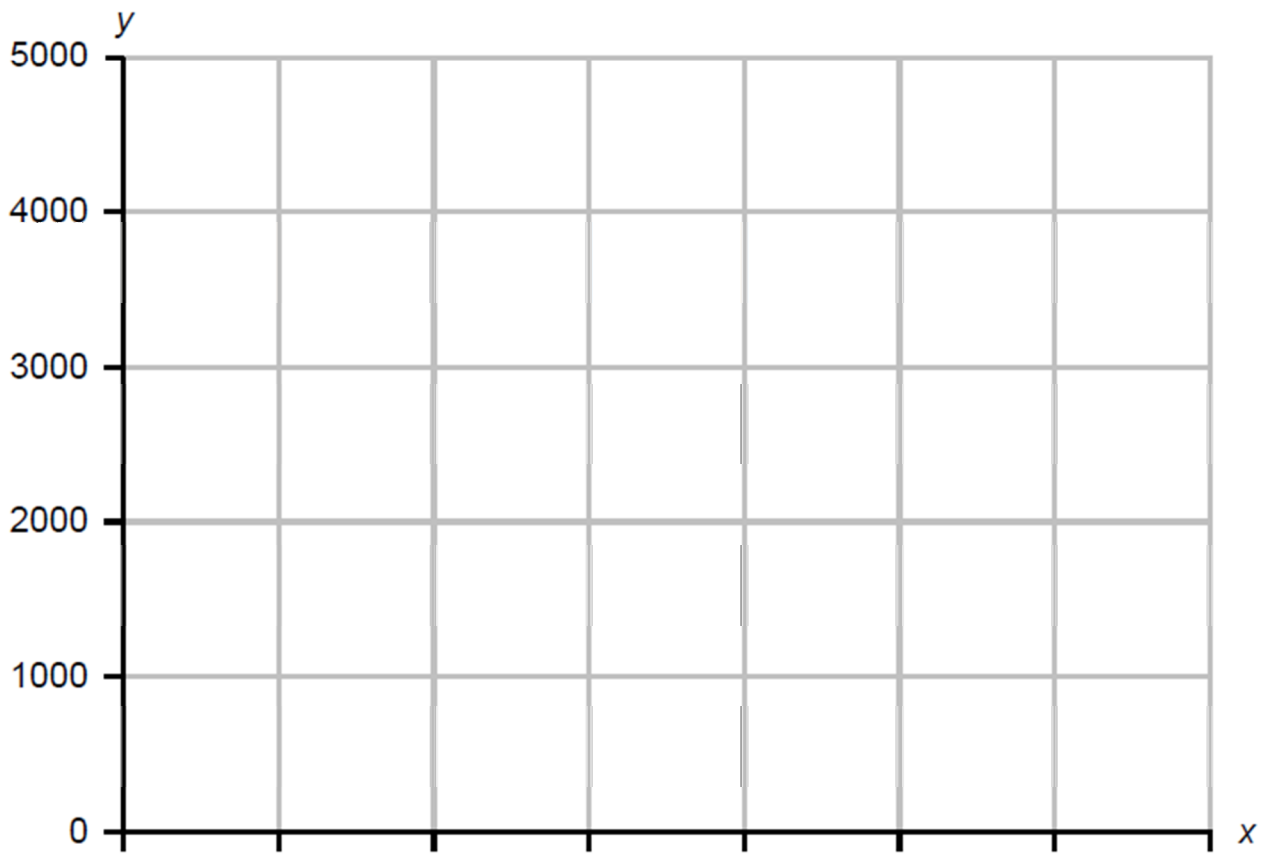
n = number of periods

eg A computer, purchased for $4 500, depreciates by $300 each year.

Calculate the value of the computer each year for five years and complete the table.

Graph your information and hence write an equation for this function.

Age (years)	Value ($)
New (0)	
1	
2	
3	
4	
5	



Equation = _____

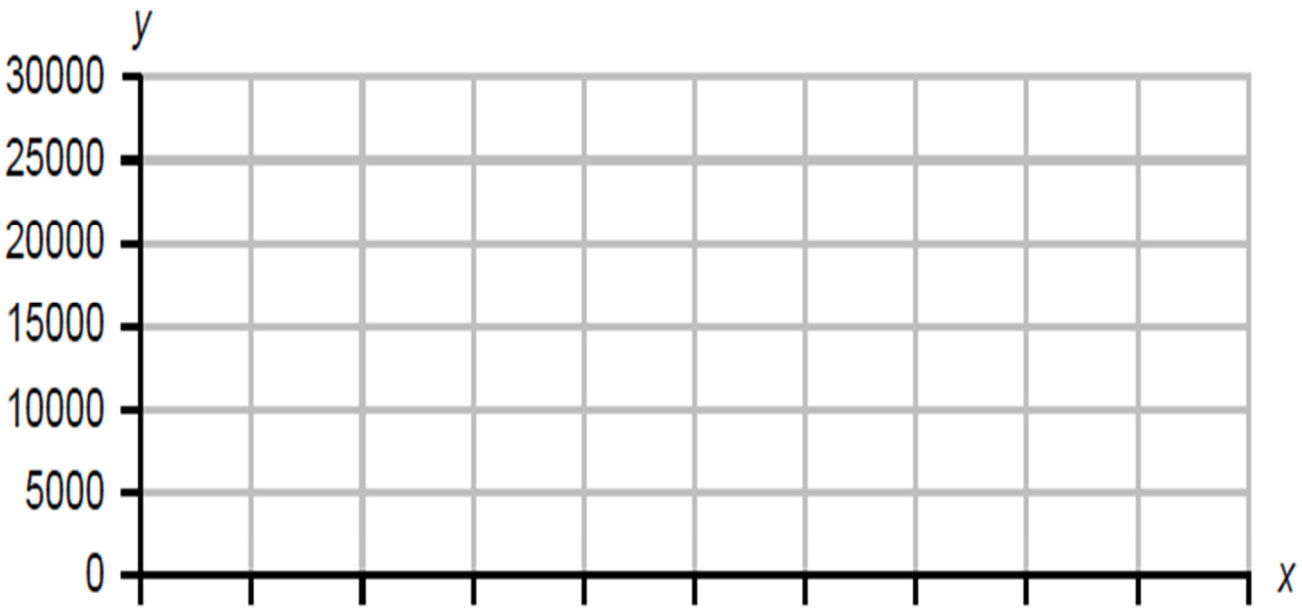
eg The value of a car purchased for $30 000 depreciates by 20% each year.

a) Complete the table of values and graph the depreciation of the car using a smooth curve.

Age of car (years)	Value ($)
New (0)	
1	
2	
3	
4	
5	

Trick!

Did you know if you put ANS then the operation and continually press the equals sign, the function will continue to process using the new answer each time!



b) Use your graph to estimate the value of the car after 10 years.

Straight Line Depreciation

$$S = V_o - Dn$$

TERMINOLOGY:

- The **service life** of an asset is the estimated time during which the asset will be useful.
- The current value after depreciation at the end of a particular period is called the **book value.**

eg A cleaning company purchases a equipment for $50 000. The equipment depreciates at a rate of $3800 per year. Calculate the salvage value of the equipment after eight years.

eg A carpenter purchases equipment for a total of $75 000. The value of the equipment is depreciated by $8600 per year. When the value of the equipment falls below $20 000 it should be replaced. Calculate the number of years after which the equipment should be replaced.

Declining balance method of depreciation

REVIEW: The declining balance method of depreciation occurs when the value of an asset depreciates by a given percentage each period.

The declining balance depreciation formula is:

$$S = V_0(1-r)^n$$

Where S is the salvage value (scrap value) of the asset;

V_0 is the purchase price of the asset;

R is the % depreciation rate

N is the number of periods.

eg A car purchased for $34 000 depreciates over 12 years at 15% pa after which it reaches its scrap value. Use the declining-balance depreciation formula to:

a) Calculate the scrap value of the car;

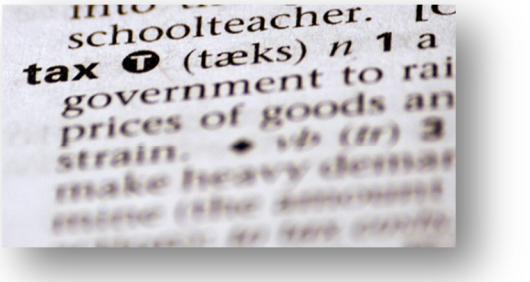
b) Calculate the book value of the car after 6 years;

c) Calculate the amount of depreciation in the 4^{th} year

eg An asset purchased for $25 000 depreciates at 15% pa after which it reaches its salvage value of $2 500.

a) Calculate the service life of the asset in years if it is depreciated by the straight-line method.
b) Calculate the service life, correct to the nearest year, if it is depreciated by the declining-balance method.

Taxation and Depreciation



If an asset is used to produce an income, then the depreciation can be used as a tax deduction.

eg On March 19 2002, George W purchased a computer for $4 500. George W's accountant advises him to depreciate the computer using the straight-line method at a rate of 20% pa.

Calculate:

a) the amount of depreciation each financial year and

b) the amount that George W can claim as a tax deduction each year given that 80% of the usage is for his business and 20% is personal use.

eg Condoleezza operates a real estate agency. She purchases a car for $33 000 at the start of the financial year. Her accountant depreciates the car over 10 years at 20% pa, after which it reaches its scrap value. Using the declining-balance method to:

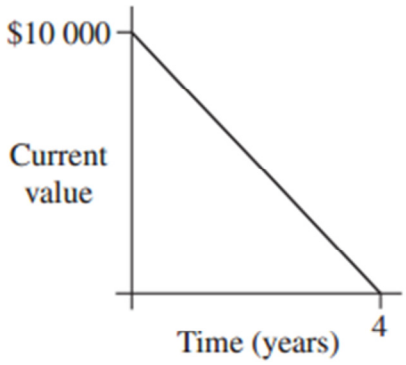
a) Calculate the scrap value of the car;
b) Calculate the book value of the car after 5 years;
c) The company pays tax at the rate of 30 cents in the dollar. Calculate the reduction in her tax bill due to the car's depreciation in the 4^{th} year of ownership.

PAST HSC QUESTIONS…

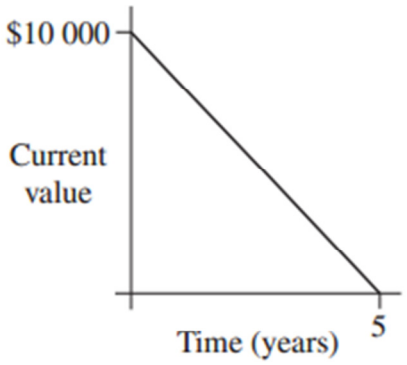
2010 MC

11 Which of the following graphs shows the lowest rate of depreciation over the given time period?

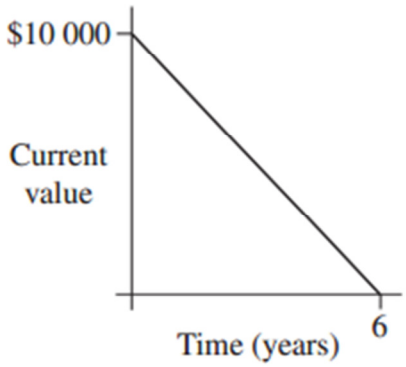
(A)



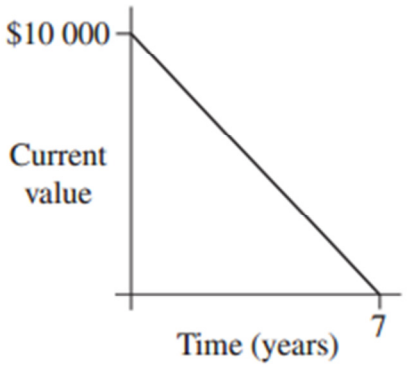
(B)



(C)



(D)



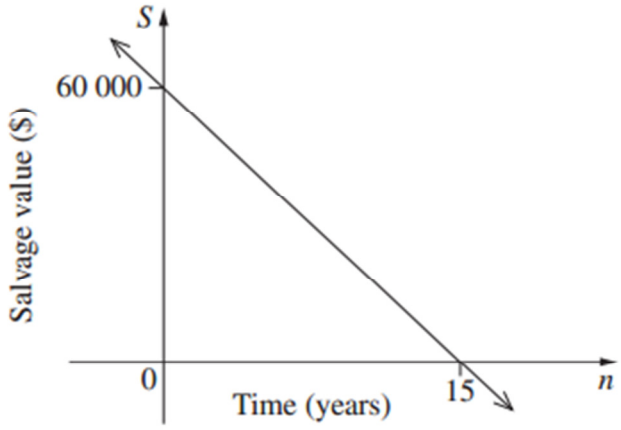
2011 Q26

(b) Norman and Pat each bought the same type of tractor for $60 000 at the same time. The value of their tractors depreciated over time.

The salvage value S, in dollars, of each tractor, is its depreciated value after n years.

Norman drew a graph to represent the salvage value of his tractor.

Norman's graph of the salvage value of his tractor



(i) Find the gradient of the line shown in the graph. **1**

(ii) What does the value of the gradient represent in this situation? **1**

(iii) Write down the equation of the line shown in the graph. **1**

(iv) Find all the values of n that are not suitable for Norman to use when calculating the salvage value of his tractor. Explain why these values are not suitable. **2**

Pat used the declining balance formula for calculating the salvage value of her tractor. The depreciation rate that she used was 20% per annum.

(v) What did Pat calculate the salvage value of her tractor to be after 14 years? **2**

(vi) Using Pat's method for depreciation, describe what happens to the salvage value of her tractor for all values of n greater than 15. **1**

2009 Q 24

(e) Jay bought a computer for $3600. His friend Julie said that all computers are worth nothing (i.e. the value is $0) after 3 years.

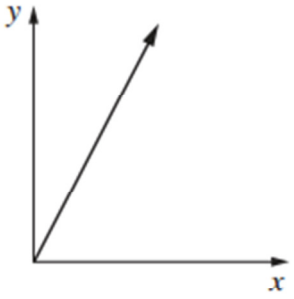
(i) Find the amount that the computer would depreciate each year to be worth nothing after 3 years, if the straight line method of depreciation is used. **1**

(ii) Explain why the computer would never be worth nothing if the declining balance method of depreciation is used, with 30% per annum rate of depreciation. Use suitable calculations to support your answer. **2**

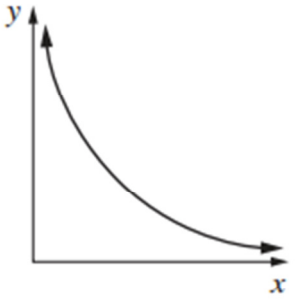
2008 MC

4 Which graph best represents $y = 3^x$?

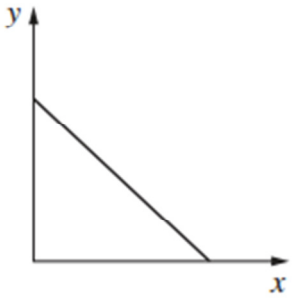
(A)



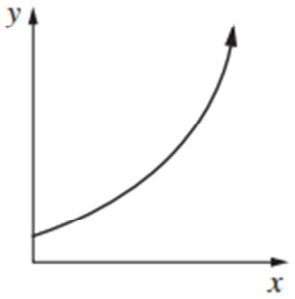
(B)



(C)



(D)



2008 Q26

(c) A plasma TV depreciated in value by 15% per annum. Two years after it was purchased it had depreciated to a value of $2023, using the declining balance method. **2**

What was the purchase price of the plasma TV?